



# **ELECTRONICS TECHNICIAN Digital Electronics**

A course that prepares individuals to apply technical knowledge and skills to assemble, install, operate, maintain, and repair electrical/electronic equipment used in business, industry, and manufacturing. Includes instruction in safety, numbering systems, logic circuits, digital devices, combinational logic circuits, and sequential logic circuits.

**USOE  
7/23/2008**

# DIGITAL ELECTRONICS

Levels: Grades 10-12  
Units of Credit: Minimum 0.5  
CIP Code: 470108  
Prerequisite: Basic Electronics or Advanced Electronics

## CORE STANDARDS, OBJECTIVES, AND INDICATORS

**STANDARD**      **Students will be able to understand and demonstrate safe practices.**  
**470108-01**

### Objectives

- 470108-0101      Use safe work practices. (A1)
- Describe the purposes of legislation concerning safety in the workplace.
  - Describe safety precautions and procedures pertaining to and working with electricity.
  - Describe correct safety procedures for hand and power tools.
  - Locate and describe shop safety equipment.
  - Use safe work practices
- 470108-0102      Use Chemicals And Lubricants (B4)
- Identify chemicals and lubricants used in the electronics industry.
  - Describe the safe storage, handling and disposal of chemicals and hazardous materials.

**STANDARD**      **Students will be able to understand and demonstrate digital electronics**  
**470108-02**

### OBJECTIVES

- 470108-0201      Perform arithmetic operations in various numbering systems (j1)
- Use the decimal number system.
  - Use the octal number system.
  - Use the hexadecimal number system.
  - Use the binary number system.
  - Convert from decimal to binary.
  - Convert between octal and binary.
  - Convert between hexadecimal and binary.
  - Convert between octal and hexadecimal.
  - Convert decimal to octal or hexadecimal.
  - Perform binary addition.
  - Perform binary subtraction.
- 470108-0202      Construct and test simple logic circuits (j2)
- Describe standard digital gates.
  - Simplify logic equations using Boolean algebra.
  - From the truth table or Boolean equation, draw the logic diagram and

- 470108-0203      predict the voltage and logic levels in all parts of the digital circuit.

  - Describe the procedures for testing and troubleshooting logic circuits.

Use, test and select digital devices (j3)

  - Identify common digital families
  - Identify the levels of integration and chip component density.
  - Describe the procedures for testing and selecting digital devices
- 470108-0204      Construct, test and troubleshoot combinational logic circuits (j4)

  - Analyze combinational logic circuits and write the Boolean equation and truth table for each circuit.
  - Simplify combinational logic circuits using Boolean identities, de Morgan's Theorem and logical equivalencies.
  - Use Karnaugh maps to simplify combinational logic circuits.
  - Determine the logical expression for any combinational logic circuit.
  - From schematic diagrams and specifications, write a truth table and the Boolean equation for combinational logic circuits.
  - From the truth table, predict the logic levels in all parts of combinational logic circuits.
  - Write the truth table of arithmetic circuits and describe how each works.
  - Describe the procedures for testing and troubleshooting combinational logic circuits.
- 470108-0205      Construct, test and troubleshoot sequential logic circuits (j5)

  - Define the properties of flip-flops.
  - Describe the principles of operation of a D flip-flop.
  - Describe the principles of operation of JK flip-flops.
  - Describe the operation and application of shift registers.
  - Describe the operation and application of frequency dividers and counters.
  - Describe the operation and application of synchronous up/down and shift counters.
  - Describe the operation and application of multivibrators.
  - Describe the procedures for testing and troubleshooting sequential logic circuits

## **PROFESSIONAL DEVELOPMENT**

**STANDARD**      **Students will understand the need for professional development.**  
**470108-03**

### **OBJECTIVES**

- 470108-0301      Complete a personal inventory.
- 470108-0302      Set and meet goals.
- 470108-0303      Be self-motivated.
- 470108-0304      Know how to make decisions.
- 470108-0305      Know how to manage time.
- 470108-0306      Organize personal belongings and lab equipment.

- 470108-0307 Learn to communicate verbally.  
 470108-0308 Write effective communications.  
 470108-0309 Establish a personal reading program.  
 470108-0310 Develop effective work skills and attitudes.  
 470108-0311 \* Master a working knowledge of SkillsUSA.
- Learn the acronym SkillsUSA.
  - State the SkillsUSA motto.
  - State the SkillsUSA creed.
  - Learn the SkillsUSA colors.
  - Describe the official SkillsUSA dress.
  - Describe the procedure for becoming a SkillsUSA officer.

**STANDARD**  
**470108-04**      **Students will understand the need for leadership skills.**

**OBJECTIVES**

- 470108-0401 Serve on a committee.  
 470108-0402 Prepare an agenda.  
 470108-0403 Assist in planning a meeting.  
 470108-0404 Review basic parliamentary procedure.
- Make a main motion.
- 470108-0405 Participate in a school project.  
 470108-0406 Attend a community meeting.  
 470108-0407 Practice effective speaking.  
 470108-0408 Present a three- to five-minute talk.  
 470108-0409 Implement a leadership project.  
 470108-0410 \* Master a working knowledge of SkillsUSA.
- Describe the meaning of the SkillsUSA emblem.
  - State the SkillsUSA pledge.
  - Describe the duties of a SkillsUSA officer.

**STANDARD**  
**470108-05**      **Students will understand the need for career planning.**

**OBJECTIVES**

- 470108-0501 Define your future occupation.  
 470108-0502 Survey employment opportunities.  
 470108-0503 Report on a trade journal article.  
 470108-0504 Explore opportunities for advanced training.  
 470108-0505 Conduct a worker interview.  
 470108-0506 Contact a professional association.  
 470108-0507 Explore entrepreneurship opportunities.  
 470108-0508 Give a talk about your career.  
 470108-0509 Review career goals.

**STANDARD  
470108-06**

**Students will understand the importance of employability and work habits.**

**OBJECTIVES**

- 470108-0601 Develop a list of work standards to follow at school and on the job.
  - 470108-0602 Evaluate your personal ethics.
    - Evaluate your personal ethics against acceptable workplace ethics.
  - 470108-0603 Build a job search network.
  - 470108-0604 Find job leads.
  - 470108-0605 Write a resume.
  - 470108-0606 Create a job portfolio.
  - 470108-0607 Complete a job application.
  - 470108-0608 Write a business letter and memo.
  - 470108-0609 Participate in an actual or simulated job interview.
- \* SkillsUSA PDP requirements - recommended